

**NEW SPECIES OF *SEMATONEURA*, *NEVACOLIMA*, AND *EULOGIA*
(LEPIDOPTERA: PYRALIDAE: PHYCITINAE) FROM COSTA RICA**

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Abstract.—Four new species of phycitines from Costa Rica are described: *Sematoneura costaricana*, *Nevacolima pitilla*, *Nevacolima georgina*, and *Eulogia duosigna*. Habitus photographs of the four moths, line drawings of the male labial palpus, antenna, and genitalia of all species, and line drawings of the female genitalia of two of the species are included.

Key Words: Phycitinae, taxonomy, neotropical

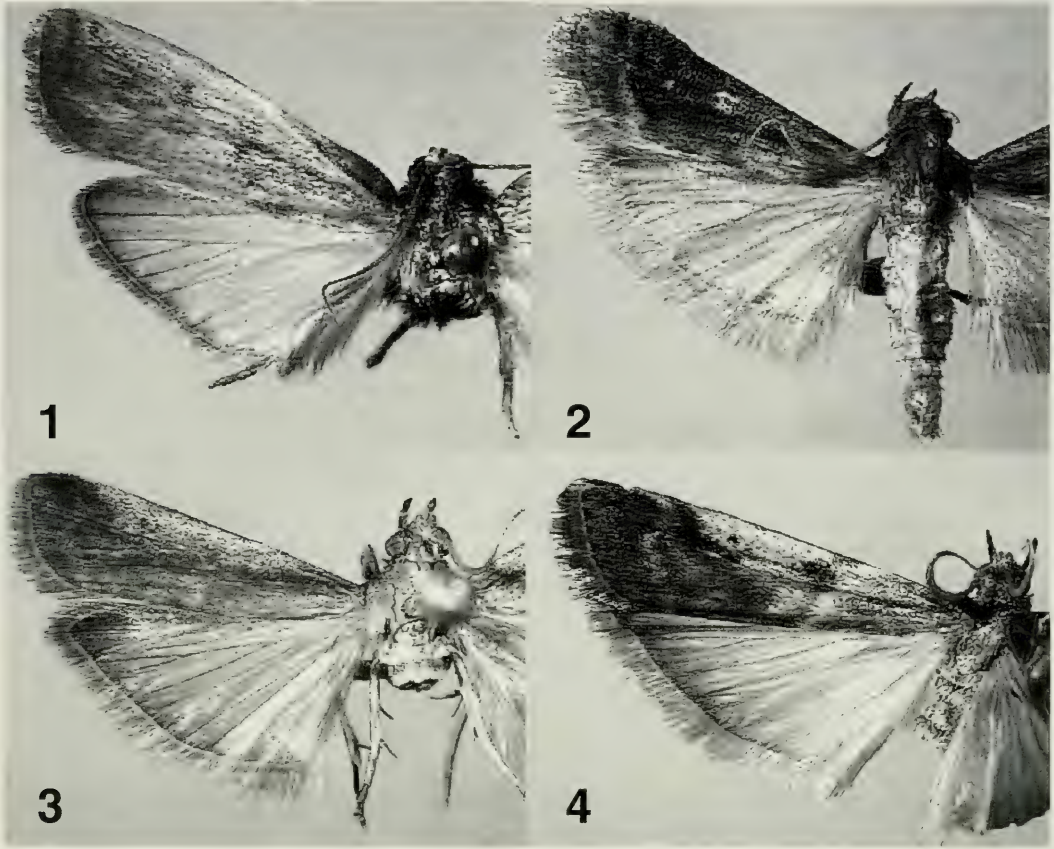
In a series of publications, Neunzig and Solis (2002a, b, 2004, 2005a, b) have provided information on the morphologically diverse and mostly undescribed phycitine fauna of Costa Rica. In this paper, we describe an additional four new species in three genera. The phycitines constitute the second largest subfamily of the Pyraloidea in the world and in Costa Rica (Solis 1997). Some phycitines are stored product pests (e.g., *Ephestia* Guenée, *Cadra* Walker, and *Plodia* Guenée), but many feed on a wide variety of fruit, nut, and timber trees, and herbaceous plants such as legumes (Heinrich 1956, Neunzig 1979). Some have been tested and used for biological control of noxious weeds, the most well known example being *Cactoblastis cactorum* (Berg), but unfortunately this phycitine has become an invasive pest in the United States (Neunzig 1997).

The new species described here are based primarily on specimens deposited

in the collection at the Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica [INBIO]. Other sources of specimens include the National Museum of Natural History, Washington, D.C., U.S.A. [USNM], the North Carolina State University Insect Collection, Raleigh, North Carolina, U.S.A. [NCSU], and the Essig Museum, University of California, Berkeley, California, U.S.A. [UCB].

***Sematoneura costaricana* Neunzig and Solis, new species**
(Figs. 1, 5–8, 21)

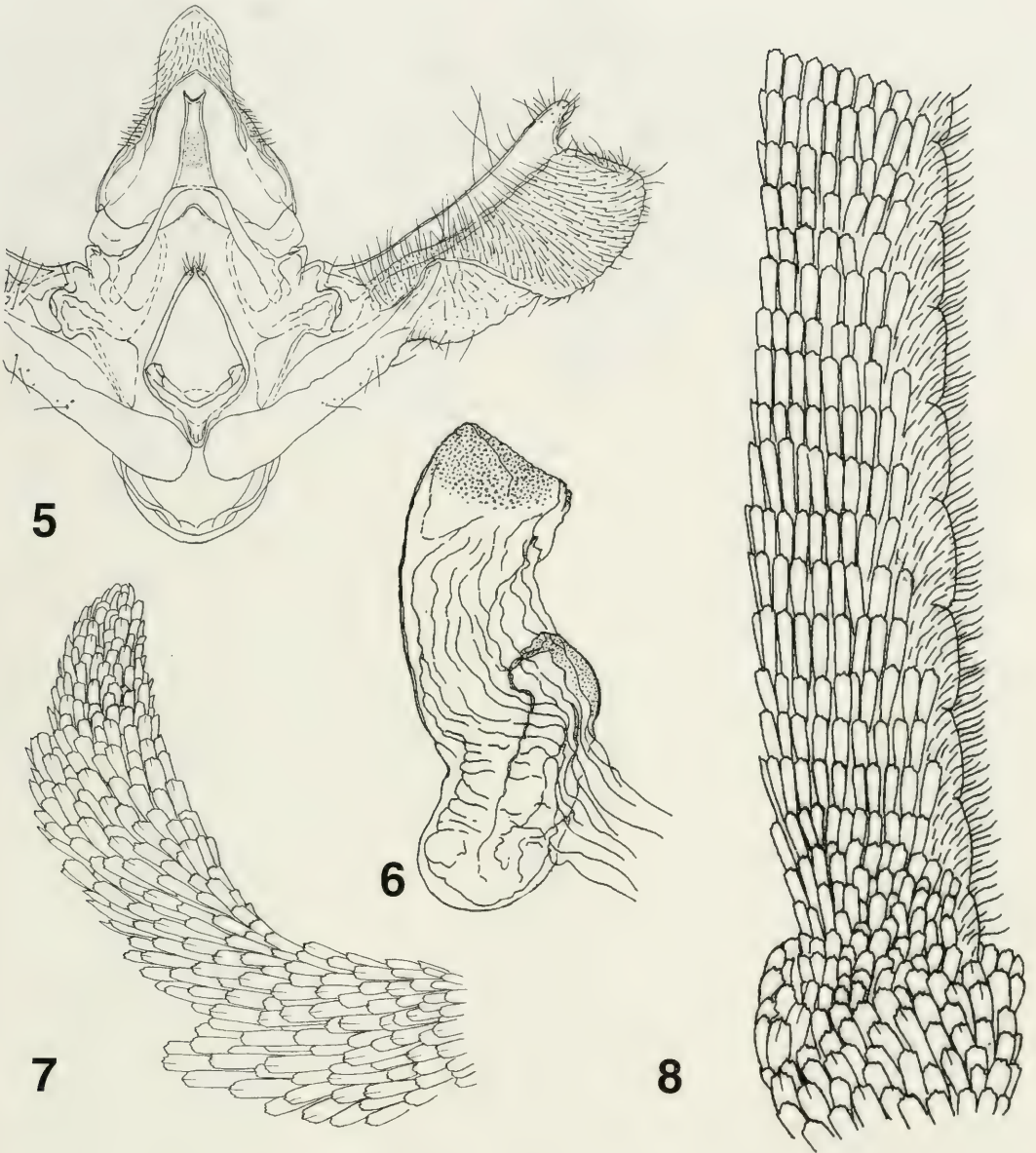
Diagnosis.—This species can be separated from other *Sematoneura* species by several characters in the male: *S. costaricana* has an indented vertex, a strongly convex costa at the base of the forewing (Fig. 1), and very slender posterior processes on the juxta (Fig. 5). The female can be identified easily by the coiled ductus bursae (Fig. 21).



Figs. 1-4. Males, dorsal view. 1, *Sematoneura costaricana* holotype. 2, *Nevacolima pitilla* holotype. 3, *Eulogia duosigna* holotype. 4, *Nevacolima georgina* holotype.

Description.—*Head:* Frons convex, ochre; vertex of male with broad, median sulcus; labial palpus (Fig. 7) upcurved in both sexes, outer surface ochre to aureus; maxillary palpus short-scaled, ochre to aureus in both sexes; antenna of male (Fig. 8) simple with sensilla trichodea about 1/5 as long as basal diameter of shaft. *Thorax:* Dorsum ochre to aureus and reddish brown. *Forewing:* Length 12.0–16.0 mm, ground color brown; costa with ochre streak chiefly in distal 1/2, and except for costal streak, anterior 1/3 of wing heavily dusted with white; a fine powdering of reddish-brown scales on white 1/3 of wing and over most of rest of wing; antemedial and postmedial lines not present (mostly a vague, black angulate streak near where postmedial

line usually located); median area of wing with ochre and aureus scales and with black discal spots. *Hindwing:* Hyaline, brown near edges. *Male genitalia* (Figs. 5, 6): Uncus triangular, constricted in distal half; apical part of gnathos a shallowly forked hook; transtilla a narrow arch, weakly developed medially; juxta a shallow, V-shaped plate with very slender, elongate, posterior, setiferous arms; valva with broadly sclerotized, costal band terminating in short, robust, outward directed process; aedoeagus robust, scobinate distally, bent basally; vesica with rounded, sclerotized process. *Female genitalia* (Fig. 21): Ostium bursae sclerotized, quadrate, with microspines; ductus bursae longer than corpus bursae, strongly spiraled, membranous; corpus



Figs. 5–8. *Sematoneura costaricana*. 5, Male genitalia, ventral view, without aedeogagus. 6, Aedeogagus. 7, Left labial palpus, lateral view. 8, Left antenna, male, frontal view.

bursae oval, membranous, except for slightly crescent-shaped, spined plate and associated group of microspines; ductus seminalis attached near junction of ductus bursae and corpus bursae.

Types.—Holotype: ♂. Fila Esquinas, 35 km S. Palmer Norte, 150 m. elev., 8°45' × 88°20', Punt. Prov., Costa Rica,

7–8 Jan. 1983, D. H. Janzen and W. Hallwachs, INBIO CRI002043900, genitalia slide 107, 811 DA [INBIO]. Paratypes: 2 ♂, 1 ♀, same data as holotype, except INBIO CRI002043840, INBIO CRI002043839, INBIO CR 1002043838, genitalia slides 107,701 DA, 1002043838 MC [INBIO, USNM, NCSU]; 1 ♂, 1 ♀,

Sirena, Corcovado Nat. Pk., Osa Peninsula, Costa Rica, 13–22 Mar. 1980, 5–11 Jan. 1981, D.H. Janzen and W. Hallwachs, INBIO CRI002043573, INBIO CRI002043307, genitalia slide 107,754 DA, 107,804 DA [INBIO, USNM]; 1 ♀, Corcovado National Park, Osa Peninsula, Costa Rica, 13–22 Mar. 1980, D.H. Janzen and W. Hallwachs, INBIO CRI002043306, genitalia slide 107,805 DA [INBIO]; 1 ♀, Turrialba, 600 m., Costa Rica, VII. 1981, V.O. Becker, genitalia slide 4923 HHN [NCSU]; 1 ♂, 9.4 km. W. Bribri, Suretka, 200 m., Limon Prov., Costa Rica, 9–11 Jun 1983, D.H. Janzen and W. Hallwachs, genitalia slide 107,700 DA [INBIO].

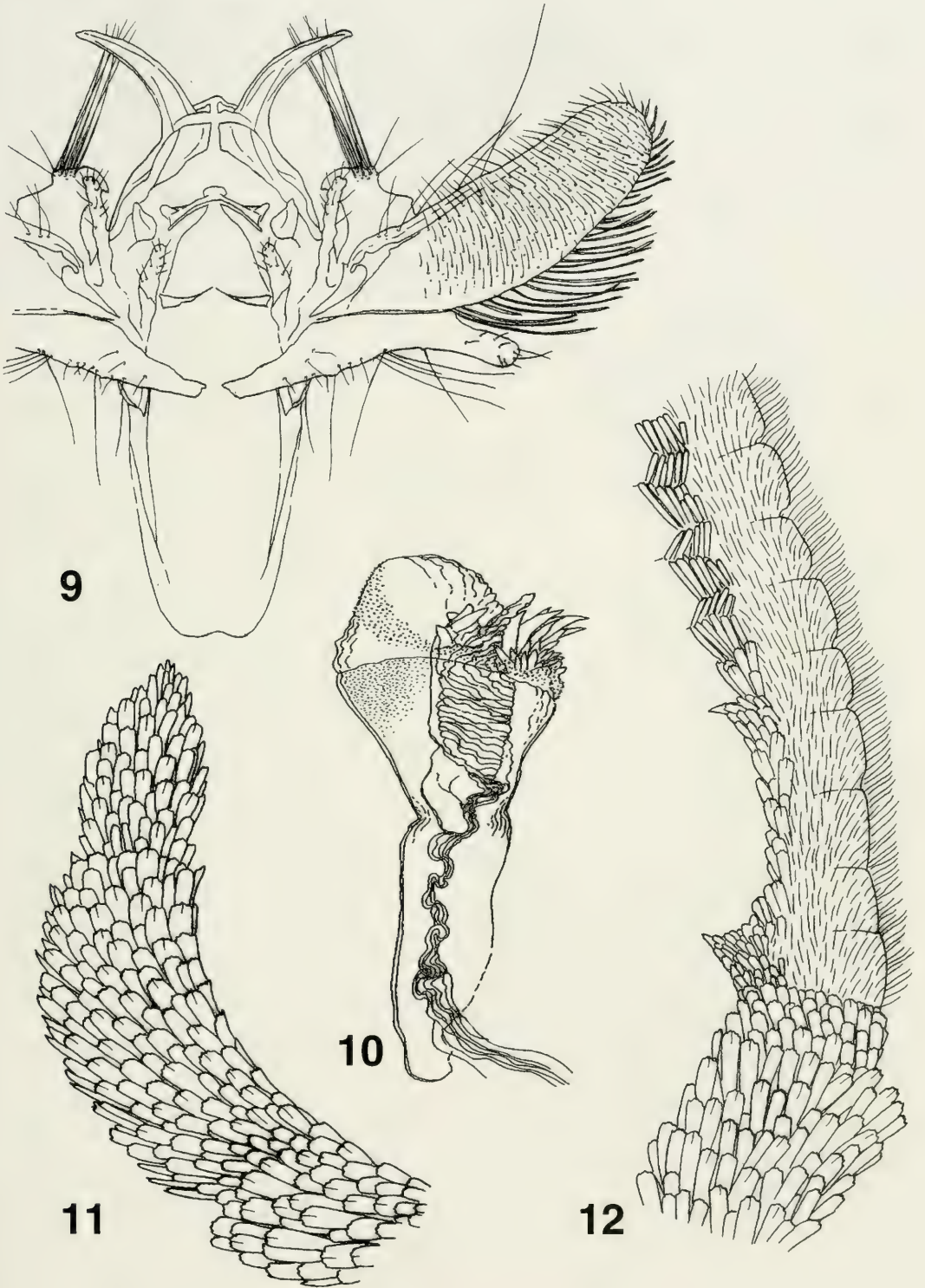
Etymology.—The specific epithet is a combination of “Costa Rica” and the Latin “*ana*” meaning “belonging to.”

Remarks.—*Sematoneura* currently consists of five species, *S. atrovenosella* Ragonot, *S. albimaculata* Neunzig and Dow, *S. abitus* Heinrich, *S. minimella* Amsel, and *S. grijpmai* Becker (Shaffer 1995). *Sematoneura grijpmai* was described from Puntarenas, Costa Rica (Becker 1974). Externally all species have a very similar forewing pattern and must be dissected for identification. There are some differences in size: *S. costaricana* and *S. atrovenosella* have an average forewing length of about 14 mm, whereas *S. albimaculata* and *S. grijpmai* are smaller with an average forewing length of about 9 mm, and the forewing of *S. minimella* is only about 6 mm. *Sematoneura atrovenosella* lacks the long juxtal processes and coiled ductus bursae of *S. costaricana*. We suspect that additional species remain to be described. Although the only published biology is for *S. grijpmai* reared on *Cedrela odorata* (L.) (Meliaceae) (Becker 1974), the USNM collection has nine specimens of *S. atrovenosella* reared on *Cedrela tonduzii* C. DC. (Meliaceae) at Rancho Redondo, Costa Rica, 1,200 m, 23-27/02/1976 by E. Holsten.

Nevacolima pitilla Neunzig and Solis,
new species
(Fig. 2, 9–12)

Diagnosis.—*Nevacolima pitilla* differs from its congeners in having the platelike lobe dorsoposteriad of the base of the costa, the valva about as long as wide (extending only $\frac{1}{4}$ the length of the valva), the digitate element at the base of the valva straight, and the transtilla with a median process (Fig. 9).

Description.—**Head:** Frons convex, white; vertex with anteriorly directed tuft of brownish-red scales, and pale ochre scales between antennae; labial palpus (Fig. 11) upcurved, outer surface mostly dark brown, basal segment heavily dusted with white; maxillary palpus short-scaled, dark brown and white; antenna (Fig. 12) with shallow sinus at base of shaft; sinus with basal and distal spines; scales on a few antennal segments distad of sinus elevated around short, thin sensilla produced from each segment; sensilla trichodea (cilia) $\frac{1}{3}$ to $\frac{1}{2}$ as long as diameter of shaft at mid-sinus. **Thorax:** Dorsum pale brown suffused with brownish red and purple. **Forewing:** Length 7.5 mm; brownish red on anterior $\frac{1}{2}$, in part dusted with white; posterior $\frac{1}{2}$ of wing mostly ochre to orange; antemedial and postmedial lines absent; discal spots red, inconspicuous. **Hindwing:** Mostly hyaline, darker along margins. **Male genitalia** (Figs. 9, 10): Uncus greatly reduced; gnathos lacking median process, but with pair of well-developed, sclerotized, posterolaterally curved, pointed, hornlike processes; transtilla a thin, slightly arched band with rounded, median process; juxta a weakly sclerotized plate with short, lateral setiferous lobes; valva with platelike, hooked and tufted lobe dorsoposteriad of base of costa extending about $\frac{1}{4}$ length of costa; cucullus spatulate with fringe of broadened setae along posterior margin; sacculus thumblike; digitate element arising



Figs. 9-12. *Nevacolima pitilla*. 9, Male genitalia, ventral view, without aedeagus. 10, Aedeagus. 11, Left labial palpus, lateral view. 12, Left antenna, male, frontal view.

from basal surface of valva long and straight; aedoeagus elongate, distal part enlarged, conelike; vesica with two clusters of spinelike cornuti; vinculum longer than greatest width. Female unknown.

Holotype.—♂ Estación Pitilla, 9 km. S. de Santa Cecilia, Prov. Guana., 700 m., Costa Rica, Feb. 1995, C. Moraga, LN329950 380450, #4355, INBIO CRI002134132, genitalia slide 4763 HHN [INBIO].

Etymology.—The specific epithet is based on the type locality, Estación Pitilla, located in Guanacaste National Park, Costa Rica.

Nevacolima georgina Neunzig and Solis,
new species

Figs. 4, 13–16

Diagnosis.—A feature that easily separates *Nevacolima georgina* from other *Nevacolima* is the presence on its forewing of an antemedial line (Fig. 4). *Nevacolima georgina* is also larger than other species in the genus; its forewing length is 11.0 mm, whereas that of other species ranges from 6.5 mm to 8.5 mm.

Description.—*Head*: Frons convex, white and ochre; vertex with anteriorly directed tuft of mostly brownish-red scales (a few black scales near eye); labial palpus (Fig. 15), upcurved, outer surface mostly black, with some dark brownish-red scales and white scales on basal segment; maxillary palpus short-scaled, mostly black; antenna (Fig. 16) with sinus at base of shaft; sinus with rounded projection basally and spine distally; scales on a few antennal segments distad of sinus elevated around short, thin sensilla produced from each segment; sensilla trichodea $\frac{1}{3}$ to $\frac{1}{2}$ as long as diameter of shaft at midsinus. *Thorax*: Dorsum pale brown suffused with

brownish red and black. *Forewing*: Length 11.0 mm; ground color brown; base black; subbasally mostly brownish red along costa and a mixture of brown, brownish red, and white on posterior $\frac{1}{2}$ of wing; antemedial line white, distinct near costa, becoming diffuse posteriorly; postmedial line white, about as distinct as antemedial line; medial area chiefly white on anterior $\frac{1}{2}$ with brownish-red patch at costa adjacent to antemedial line, followed posterodistally by larger mostly black patch; posterior $\frac{1}{2}$ of medial area suffused with brownish red and ochre; discal spots black, distinct, closely followed distally by black and brownish-red patch; terminal area suffused with brownish red and ochre, lightly dusted with white distally. *Hindwing*: Mainly hyaline, brown along margins. *Male genitalia* (Figs. 13, 14): Similar to those of *Nevacolima pitilla* with the following differences: transtilla a pair of triangular plates, slightly touching medially; valva with basal, tufted, platelike lobe adjacent to base of costa more elongate (extending $\frac{1}{3}$ length of valva); sacculus joined to rest of valva along its entire length; and vesica with small sclerotized plate rather than cornuti. Female unknown.

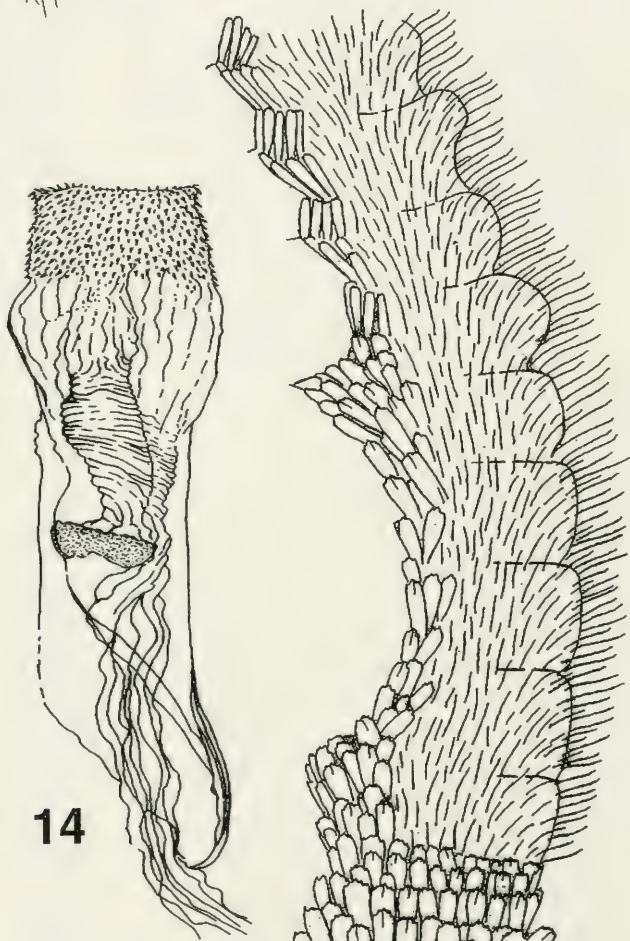
Holotype.—♂. Pension La Georgina, 3,000 m., Cerro de Muerte, S. border Cartago Province, Costa Rica, 23/25 V 1985, J. Powell and P.A. Opler, genitalia slide 4882 HHN [UCB].

Etymology.—Named after Pension La Georgina where the holotype was collected.

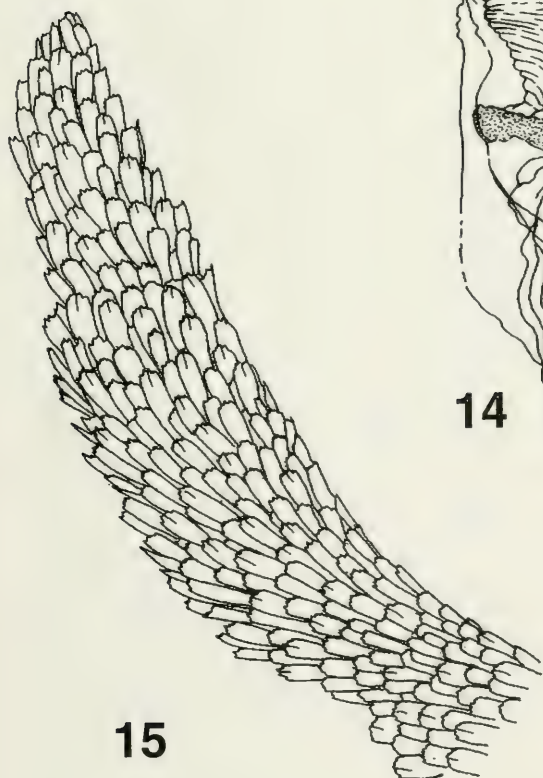
Remarks.—*Nevacolima* was described by Neunzig in 1994 for two new species, *N. jaliscoiensis* and *N. zodia*, from near Nevado de Colima, Jalisco, Mexico. The genitalia of males of *Nevacolima* are easily recognized by a greatly reduced



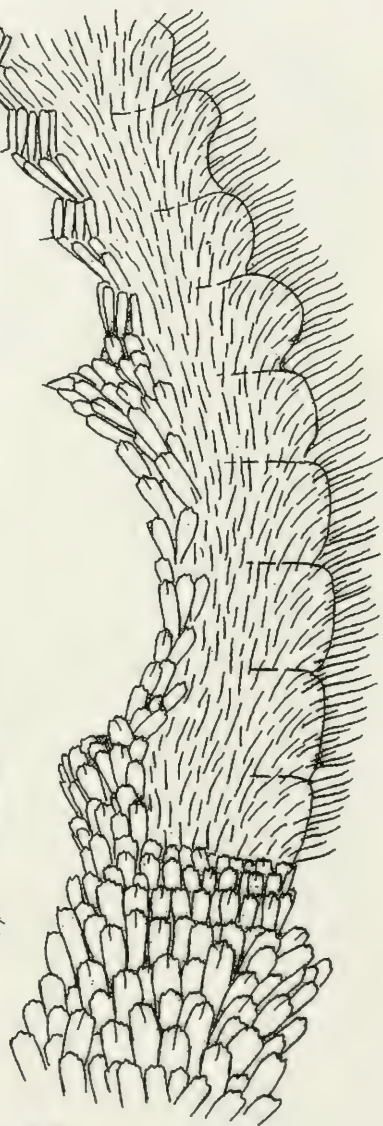
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14



15



16

or absent uncus and a highly modified gnathos. The posterior part of the genitalia consists mainly of the gnathos that is reduced to two strongly developed, posterolaterally diverging hornlike elements (Figs. 9, 13). The females and biologies are unknown for all species.

Eulogia duosigna Neunzig and Solis,
new species

(Figs. 3, 17–20, 22)

Diagnosis.—Males of *E. duosigna* have the distal aspect of the gnathos entire, the transtilla complete, and the vesica simple (Figs. 17, 18), whereas *E. ochrifrontella* males have the distal aspect of the gnathos bifurcate, the transtilla lacking a sclerotized median element, and the vesica armed with a cornutus. The most obvious difference between females of the two species is in the corpus bursae where two signa are present in *E. duosigna* (Fig. 22) and one in *E. ochrifrontella*.

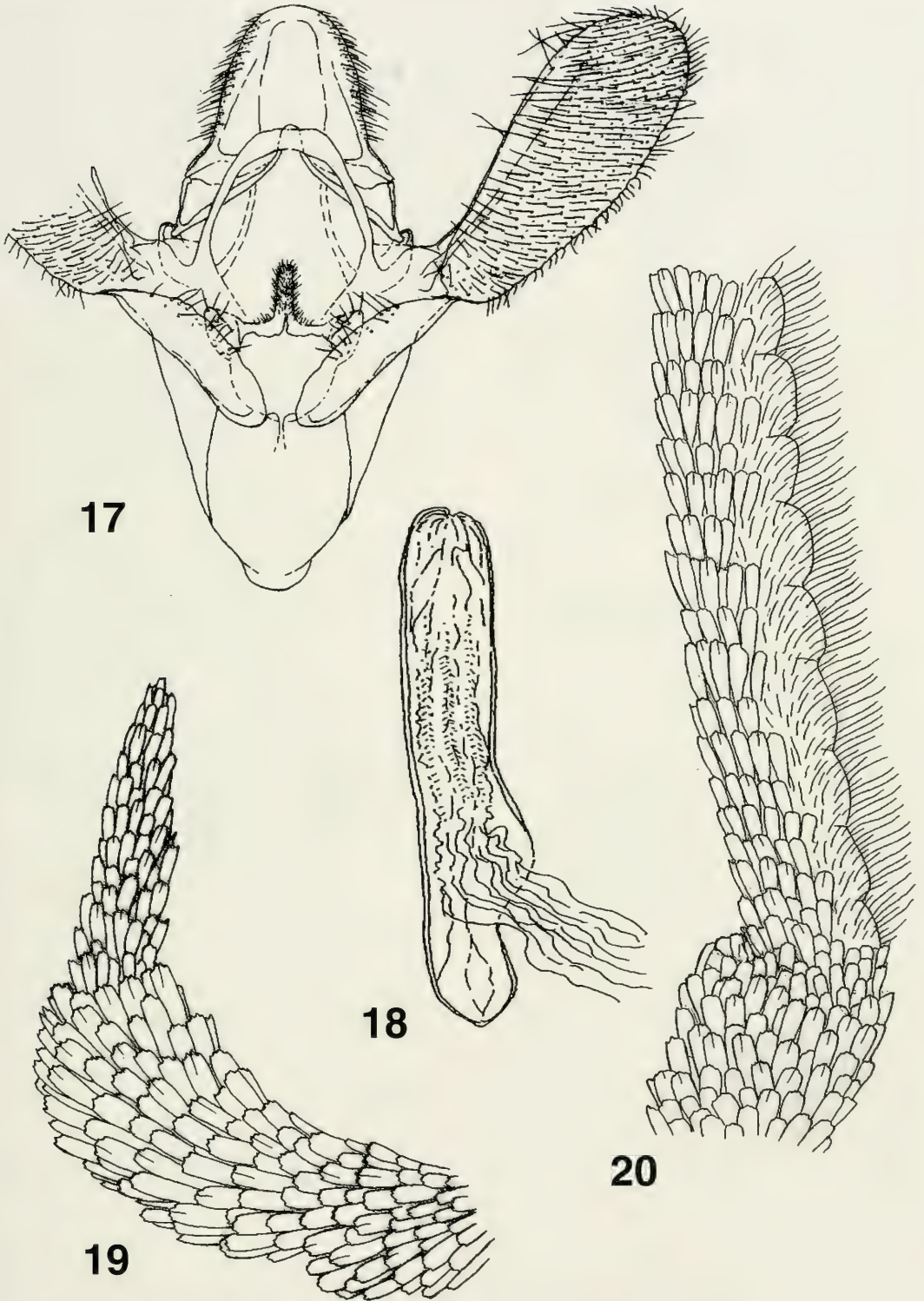
Description.—*Head*: Frons convex, pale brown to brown; vertex pale brown; labial palpus (Fig. 19) upcurved in both sexes, second segment broadly scaled, outer surface dark brown to dark purplish brown or black; maxillary palpus short-scaled, dark brown to dark purplish brown; antenna (Fig. 20) of both sexes simple. *Thorax*: Dorsum pale brown to dark brown. *Forewing*: Length 6.0–6.5 mm; basal $\frac{2}{3}$ of wing mostly to entirely dark brown to dark purplish brown or black (base of wing and posterior edge of wing with varying amounts of pale reddish brown); antemedial line absent; postmedial line ochre; most of distal $\frac{1}{3}$ of wing pale brown and ochre; discal spots small, fused, ochre. *Hindwing*: Hyaline, brown along margins. *Male genitalia* (Figs. 17, 18): Uncus subtriangular, rounded distally; apical part of gnathos entire, small, rounded; transtilla complete, well developed with broad bridgelike band apically; juxta V-shaped with contiguous setiferous ele-

ments medially, and short, robust, lateral arms; valva simple; aedoeagus moderately elongate; vesica with rows of microspines; vinculum slightly longer than greatest width. *Female genitalia* (Fig. 22): Ostium bursae slightly enlarged, weakly sclerotized; ductus bursae membranous, slightly shorter than corpus bursae; corpus bursae membranous with pair of opposing signa, each composed of cluster of thornlike spines.

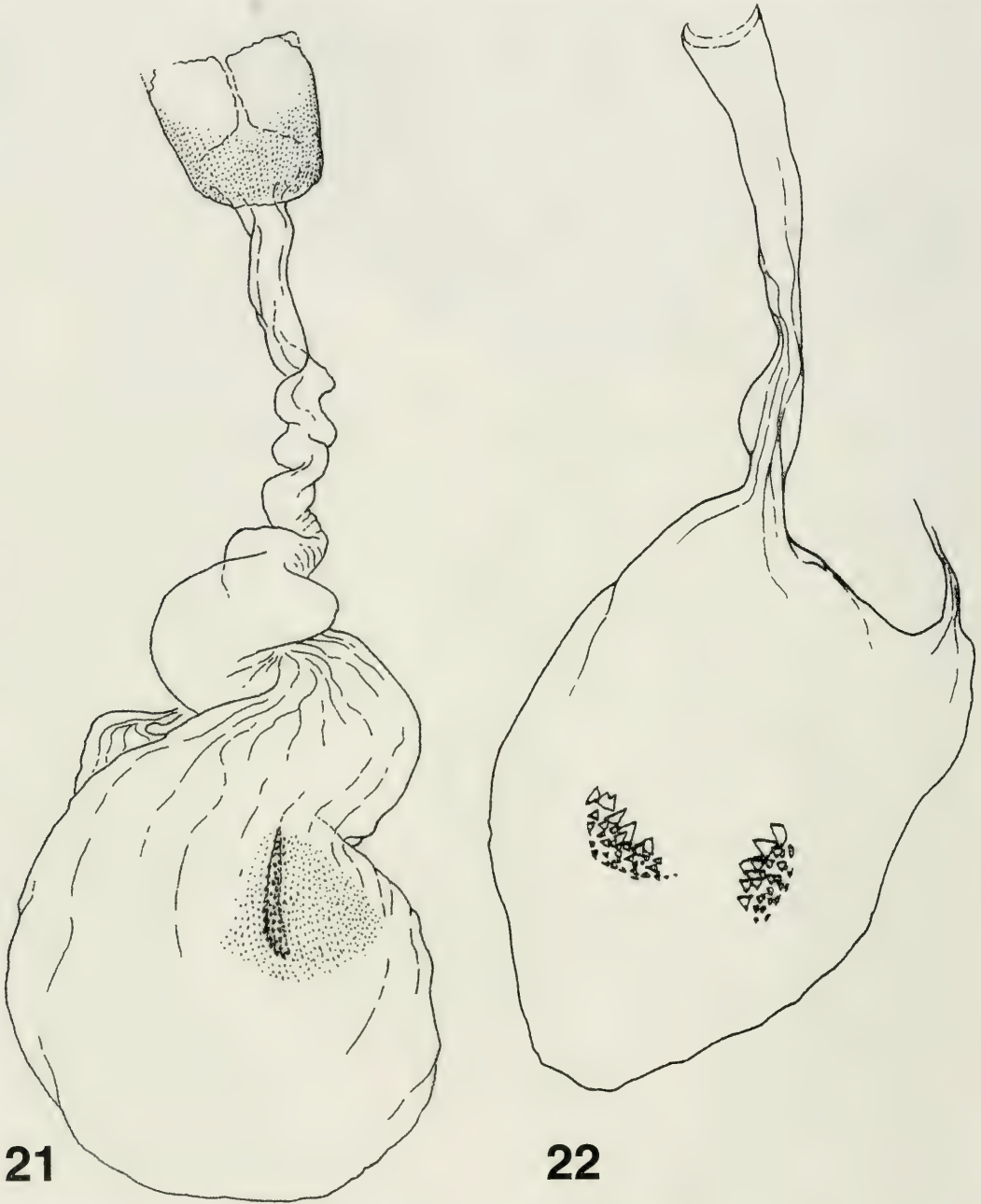
Types.—Holotype: ♂. Est. Pitilla, 700 m, 9 km. S. Sta. Cecilia, P.N. Guanacaste, Prov. Guanacaste, Costa Rica, May 1991, A.C. Moraga, L-N330200-380200, INBIO CRI000649063, genitalia slide 4747 HHN (INBIO). Paratypes: 1 ♂, same data as holotype, except 19 May–3 June 1993, INBIO CRI001343273 (NCSU); 1 ♀, 4 km. E. Casetilla, Rincon Nat. Pk, 750 m, Gste. Prov. Costa Rica, 27 Dec. 1981, D.H. Janzen and W. Hallwachs, INBIO CRI002043351, genitalia slide 104,159 MSW (USNM); 1 ♂, Monteverde, Punt. Prov., Costa Rica, 8–10 Dec. 1978, D.H. Janzen, genitalia slide 104, 166 MJW (INBIO); 1 ♀, Fca. Cafrosa, Est. Las Mellizas, P.N. Amistad, Costa Rica, M. Ramirez and G. Mora, Nov. 1990, L-N316100596100, INBIO CRI000521817, genitalia slide 4748 HHN (NCSU); 1 ♂, El Angel Waterfall, 1,350 m., 8.2 km, downhill, Vara Blanca, Heredia Prov., Costa Rica, 3 Jan 1981, D. Janzen and W. Hallwachs, INBIO CRI002043352, genitalia slide 104,160 MJW (USNM).

Eymology.—The specific epithet is based on the presence of two signa in the corpus bursae.

Remarks.—The only congener is *Eulogia ochrifrontella* (Zeller), a Nearctic species occurring from Nova Scotia to British Columbia in Canada and throughout the eastern half of the United States (Neunzig 1990). This species has been associated with apple, pecan, and oak trees (Heinrich 1956), but these records are questionable and its biology



Figs. 17-20. *Eulogia duosigna*. 17, Male genitalia, ventral view, without aedeagus. 18, Aedeagus. 19, Left labial palpus, lateral view. 20, Left antenna, male, frontal view.



Figs. 21–22. Female genitalia. 21, *Sematoneura costaricana*, ostium bursae, ductus bursae, corpus bursae, and part of ductus seminalis, ventral view. 22, *Eulogia duosigna*, ostium bursae, ductus bursae, corpus bursae, and part of ductus seminalis, ventral view.

has not been studied. *Eulogia duosigna* is the first Neotropical species in this genus discovered, and its biology is unknown. Externally the forewing of the genus is

distinctive; the species have the basal two-thirds dark brown or black and the distal one-third a contrasting light brown and ochre.

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LITERATURE CITED

- Becker, V. O. 1974. Studies on the shootborer *Hypsipyla grandella* (Zeller) (Lepidoptera, Pyralidae). XXVI. A new genus and three new species of Microlepidoptera (Pyralidae and Gracillariidae) associated with *Carapa*, *Cedrela*, and *Swietenia* in Costa Rica. *Turrialba* 24(3): 332–335.
- Heinrich, C. 1956. American moths of the subfamily Phycitinae. *United States National Museum Bulletin* 207: 1–581.
- Neunzig, H. H. 1979. Systematics of immature phycitines (Lepidoptera: Pyralidae) associated with leguminous plants in the southern United States. *Technical Bulletin, United States Department of Agriculture* 1539, 119 pp.
- . 1990. Pyraloidea: Pyralidae (part) Phycitinae (part). *In* Dominick, R. B. et al. *The Moths of America North of Mexico* 15.3: 1–165.
- . 1994. New Genera and species of Mexican Phycitinae (Lepidoptera: Pyralidae). *Proceedings of the Entomological Society of Washington* 96: 357–366.
- . 1997. Pyraloidea: Pyralidae (part) Phycitinae (part). *In* Dominick, R. B. et al. *The Moths of America North of Mexico* 15.4: 1–157.
- Neunzig, H. H. and M. A. Solis. 2002a. The *Ceracanthia* complex (Lepidoptera: Pyralidae: Phycitinae) in Costa Rica. I. *Ceracanthia* Ragonot. *Proceedings of the Entomological Society of Washington* 104: 837–855.
- . 2002b. The *Ceracanthia* complex (Lepidoptera: Pyralidae: Phycitinae) in Costa Rica. II. *Megarhria* Ragonot, *Drescoma* Dyar, and *Lascelina* Heinrich. *Proceedings of the Entomological Society of Washington* 104: 980–992.
- . 2004. *Exguiana*, a new genus of Neotropical phycitines (Lepidoptera: Pyralidae). *Proceedings of the Entomological Society of Washington* 106: 554–563.
- . 2005a. *Tumoriala*, a new Neotropical phycitine genus (Lepidoptera: Pyralidae). *Proceedings of the Entomological Society of Washington* 107: 84–89.
- . 2005b. A review of the genus *Difundella* Dyar (Lepidoptera: Pyralidae: Phycitinae). *Proceedings of the Entomological Society of Washington* 107: 303–314.
- Shaffer, J. C. 1995. Phycitinae, 93–105. *In* Heppner, J. B. ed. *Check List Part 2: Atlas of Neotropical Lepidoptera*. Brill/Flora and Fauna Books, Gainesville, Florida. 243 pp.
- Solis, M. A. 1997. Snout Moths: Unraveling the taxonomic diversity of a speciose group in the Neotropics, 231–241. *In* Reaka-Kudla, M. L., D. E. Wilson, and E. O. Wilson, eds. *Biodiversity II: Understanding and protecting our biological resources*. Joseph Henry Press, Washington, D.C. 551 pp.